MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

PSM0325 – INTRODUCTION TO PROBABILITY AND STATISTICS

(Foundation in Information Technology / Life Sciences)

2 JUNE 2016
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **THREE** pages excluding the cover page and the Appendix.

2. Answer **FIVE** out of **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.

4. **Statistical table** is provided.

Instruction: Answer **FIVE** out of **SIX** questions.

Question 1 (10 marks)

a. The following data gives the test scores of a sample of 60 students in a Mathematics preparation test.

Test Scores	Number of Students
40 – 44	5
45 – 49	11
50 – 54	14
55 – 59	12
60 – 64	10
65 – 69	8

Calculate the variance of the test scores. (6 marks)

b. In a class assignment, each student must choose one of the three assignments given by the lecturer. 25% of the students will choose Assignment A, 65% will choose Assignment B, and 10% will choose Assignment C. The probability that a student will pass Assignment A is 60%, Assignment B is 80%, and Assignment C is 70%.

Find the probability that

i. a student will pass the assignment. (2 marks)

ii. a student has chosen Assignment B, given that the student has passed the assignment. (2 marks)

Question 2 (10 marks)

a. The probability function of a discrete random variable X is given by:

x	2	3	4	5
$p(x)$	0.19	0.24	0.42	k

i. The probability that X is greater than 3 is 0.57.
Find the value of the constant k. (1 mark)

ii. Find the mean and variance of X. (3 marks)

Continued ...

b. The probability density function of a random variable X is given below:

$$f(x)=\begin{cases}\frac{1}{27}(x^2+2); & 1<x<4\\ 0; & \textit{otherwise}\end{cases}$$

i. Find the probability that X is between 2 and 3. (3 marks)
ii. Calculate the mean of X. (3 marks)

Question 3 (10 marks)

a. The average number of students who attend an optional night class is 7 students per night. Find the probability that the class

i. will have more than 10 students per night. (2 marks)
ii. will have 5 to 9 students per night. (3 marks)

b. In a Statistics test, past data showed that 85% of the students will attempt all the questions. In a sample of 18 students, find the probability that

i. exactly 10 students will attempt all the questions. (3 marks)
ii. less than 15 students will attempt all the questions. (2 marks)

Question 4 (10 marks)

The weight of the students in a tuition center is normally distributed with a mean of 50 kg and a standard deviation of 4 kg.

a. If a student is selected at random, find the probability that

i. the weight of the student will be between 40 kg and 55 kg. (4 marks)
ii. the weight of the student will be less than 48 kg. (3 marks)

b. If 15% of the students have weights greater than p kg, find the value of p. (3 marks)

Continued ...

Question 5 (10 marks)

a. The results of all the 5 participants in a contest are given:

10 13 10 12 16

List all the possible samples of size four from this data and construct a sampling distribution of the sample mean. (4 marks)

b. The monthly sales achieved by the salespersons in a company has a mean of RM12,000 with a standard deviation of RM2,500. Find the probability that the mean monthly sales of a random sample of 45 salespersons in the company is:

i. more than RM13,000. (2 marks)
ii. within RM720 of the population mean. (4 marks)

Question 6 (10 marks)

The mean response time of the participants in a speed competition is 30 seconds, with a standard deviation of 2 seconds. The response time of a sample of 50 participants are collected to determine if the response time has changed, and the mean response time of the 50 participants is 29 seconds.

a. Based on the response time of the 50 participants, construct a 95% confidence interval for the mean response time of all the participants. (4 marks)

b. At the 0.05 level of significance, is there evidence to show that the participants' response time is faster? (6 marks)

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APPENDIX

FORMULA

For Grouped Data

1. Mode = $L+\left[\dfrac{f_m - f_B}{(f_m - f_B)+(f_m - f_A)}\right]c$

2. Median = $L+\left[\dfrac{\left[\dfrac{\sum f+1}{2}\right]-F_L}{f_m}\right]c$

3. Mean =

Sample	Population
$\bar{x}=\dfrac{\sum mf}{\sum f}$	$\mu=\dfrac{\sum mf}{\sum f}$

4. Variance =

Sample	Population
$s^2=\dfrac{\sum m^2 f-\dfrac{(\sum mf)^2}{\sum f}}{(\sum f)-1}$	$\sigma^2=\dfrac{\sum m^2 f-\dfrac{(\sum mf)^2}{\sum f}}{\sum f}$

5. Standard Deviation = $\sqrt{Variance}$